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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/609,505	06/30/2003	Pan Ki Kwon	30205/39439	1321

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EXAMINER
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VINH, LAN

ART UNIT	PAPER NUMBER
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1765

DATE MAILED: 07/26/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/609,505

Applicant(s)

KWON ET AL.

Examiner

Lan Vinh

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
  - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
  - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
  - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 05 July 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1 and 3-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,3-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☒ Certified copies of the priority documents have been received in Application No. 10/605,505.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
  2. Ascertaining the differences between the prior art and the claims at issue.
  3. Resolving the level of ordinary skill in the pertinent art.
  4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
2. Claims 1, 3, 5-9, 11-12, 14-18, 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee (US 6,607,955) in view of Tsuchiya et al (US 6,585,568)

Lee discloses a method for manufacturing a contact in a semiconductor device, the method comprising:

forming a wordline pattern having a sequentially stacked structure of a wordline conductive material 103 and a hard mask nitride film 104 on a semiconductor substrate (col 6, lines 11-13; fig. 3D)

forming a nitride film spacer 112 on a side of the wordline pattern (col 6, lines 58-60)

forming a planarized interlayer insulating film 114 on the wordline pattern (col 6, lines 66-67)

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etching the interlayer insulating film until the substrate is exposed, to form a contact hole (col 7, lines 21-27)

forming a doped polysilicon layer on the surface of the interlayer insulating film filling the contact hole (col 7, lines 54-56)

performing a chemical mechanical polishing (CMP) process on the polysilicon layer and the interlayer insulating film to expose the hard mask layer 104 using a CMP slurry on the polysilicon layer and insulating layer 114 (col 7, lines 57-62; fig. 3H)

Unlike the instant claimed inventions as per claims 1,3, 5-8, 12, 14-17, Lee fails to specifically disclose polishing the polysilicon and insulating layer using an acidic oxide CMP slurry having a pH ranging from 2 to 7 containing 1-40% of an oxidizer such as hydrogen peroxide

Tsuchiya discloses a method for polishing a conductive film formed on an insulating film using a CMP slurry contains acid, 0.1-50 % of alumina and 15% of an oxidizer such as hydrogen peroxide, the slurry having a pH ranging from 3 or more (col 5, lines 12-63; col 6, lines 24-26)

Since Lee is concerned with a step of forming a contact pad/plug (col 7, lines 58-60), one skilled in the art at the time the invention was made would have found it obvious to modify Lee polishing step by using an acidic CMP slurry for oxide as per Tsuchiya because Tsuchiya discloses that the polishing slurry in his invention may be most effective used when polishing by CMP is conducted to a substrate having a connection hole to form via plug and contact plug (col 7, lines 8-15)

The limitations of claims 9, 18 have been discussed above

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Regarding claims 11, 20, Lee discloses that the layer 114 comprises of HDP oxide (col 6, lines 66-67; col 7, lines 1-3)

3. Claims 4, 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee (US 6,607,955) in view of Tsuchiya et al (US 6,585,568) and further in view of Small et al (US 6,635,186)

Lee as modified by Tsuchiya has been described above. Unlike the instant claimed inventions as per claims 4, 13, Lee and Tsuchiya do not specifically disclose using 20-30 vol % of the oxidizer based on the CMP slurry

Small discloses a method for polishing comprises the step of using 30 % of the H<sub>2</sub>O<sub>2</sub>/oxidizer based on the CMP slurry (col 21, lines 44-45)

Thus, one skilled in the art at the time the invention was made would have found it obvious to modify Lee and Tsuchiya by using 30 vol % of the oxidizer based on the CMP slurry as per Small because according to Small, the slurry contains 30 vol % of the oxidizer polishes better than the traditional hydrogen peroxide chemistry for copper/conductive CMP (col 21, lines 48-59)

4. Claims 10, 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee (US 6,607,955) in view of Tsuchiya et al (US 6,585,568) and further in view of Liu et al (US 6,635,576)

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Lee as modified by Tsuchiya has been described above. Unlike the instant claimed inventions as per claims 10, 19, Lee and Tsuchiya fail to disclose using SiON material in the wordline structure

Liu discloses a method for fabricating a semiconductor device comprises the step of using SiON material in the wordline structure (col 8, lines 26-28)

Hence, one skilled in the art at the time the invention was made would have found it obvious to modify Lee and Tsuchiya method by using SiON material in the wordline structure as per Liu because Liu discloses that SiON provides graded-stair etch concept that is important to the invention (col 8, lines 28-30)

### ***Response to Arguments***

5. Applicant's arguments filed 7/5/2005 have been fully considered but they are not persuasive.

Applicants argue that nowhere in Lee or Tsuchiya is the concept taught or suggested of using an acidic oxide film CMP slurry and the use of that slurry on both a polysilicon layer and an interlayer insulating film because Lee does not teach using of an acidic oxide film CMP slurry and the use of that slurry on both a polysilicon layer and an interlayer insulating film and Tsuchiya does not teach using the slurry on a polysilicon and an interlayer insulating film. This argument is unpersuasive for the following reason:

It is noted that "Unobviousness can not be established by attacking the reference individually when the rejection is based on the combination of references. In re Novak 16 USPQ 2d 2041,2043 (Fed. Cir., BPAI 1989). In this case Lee discloses the use of

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CMP slurry on both a polysilicon layer/conductive layer and an interlayer insulating film (fig. 3H of Lee shows the polishing step removes both polysilicon layer and interlayer insulating film 114) and Tsuchiya discloses using an CMP slurry containing an oxidizer/claimed acidic oxide film CMP slurry and the use of that slurry on both a metal layer/conductive layer and an interlayer insulating film (fig. 1C of Tsuchiya shows the polishing step removes both metal/conductive layer 5 and interlayer insulating film 3. The examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). Since Lee is concerned with a step of forming a contact pad/plug by a CMP step and Tsuchiya provides the motivation to combine the references by disclosing that the polishing slurry in his invention may be most effective used when polishing by CMP is conducted to a substrate having a connection hole to form via plug and contact plug, one skilled in the art at the time the invention was made would have found it obvious to employ Tsuchiya slurry in Lee method to produce the claimed invention. Thus, the examiner asserts that the combination of Lee and Tsuchiya suggests every element of the claimed invention

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

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A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

### ***Conclusion***

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lan Vinh whose telephone number is 571 272 1471. The examiner can normally be reached on M-F 8:30-5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571 272 1465. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.



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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



LV

July 22, 2005